IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF OKLAHOMA

STATE OF OKLAHOMA, ex rel. W. A. DREW EDMONDSON, in his capacity as ATTORNEY GENERAL OF THE STATE OF OKLAHOMA and OKLAHOMA SECRETARY OF THE ENVIRONMENT C. MILES TOLBERT, in his capacity as the TURSTEE FOR NATURAL RESOURCES FOR THE STATE OF OKLAHOMA,

Plaintiffs,

vs. 05-CV-0329 GKF-SAJ

TYSON FOODS, INC., TYSON POULTRY, INC., TYSON CHICKEN, INC., COBB-VANTRESS, INC., AVIAGEN, INC., CAL-MAINE FOODS, INC., CAL-MAINE FARMS, INC., CARGILL, INC., CARGILL TURKEY PRODUCTION, LLC, GEORGE'S, INC., GEORGE'S FARMS, INC., PETERSON FARMS, INC., SIMMONS FOODS, INC., and WILLOW BROOK FOODS, INC.,

Defendants.

VIDEO DEPOSITION OF HAILIN ZHANG, Ph.D.
TAKEN ON BEHALF OF THE DEFENDANTS
JANUARY 16, 2008, BEGINNING AT 9:00 A.M.
IN OKLAHOMA CITY, OKLAHOMA

REPORTED BY: Laura L. Robertson, CSR, RPR

MR. NANCE: I don't remember whether it was before or after the mediation process. But I wanted the record to reflect that although it is privileged, I have been there more than once. I just didn't want you to have the impression that it was just last week.

THE WITNESS: It is at least three years ago, I checked my calendar.

MR. GRAVES: I think my actual question was in preparation for the deposition.

MR. NANCE: I thought you asked about longer term contact.

MR. GRAVES: Okay.

MR. NANCE: So I just wanted to clear that up.

Q. (BY MR. NANCE) Doctor, you talked with several of the examining counsel about the role of STP65. What is the significance of STP65 when it comes to the growth response of plants?

A. Well, as the soil test P increases from zero to 65, the response of plants to additional phosphorous fertilizers diminishes. When you're at 65 or higher, you almost have no agronomic benefit, that means no yield increase by applying additional fertilizer. So that's why we do not recommend any phosphorous when soil test reaches that point.

interested in a number higher than 65 as being a benchmark?

MR. GRAVES: Object to the form.

THE WITNESS: Yes, I think we proposed 120 number during that time. The reason for that was when average soil test reached 65, some parts of the field might be still deficient in phosphorous because of special variability.

So if you apply a small amount of P, you may get some response. If farmers buy commercial fertilizer to do that, you may not be economical, that's why we just cut it off.

But if a producer has another source of phosphorous, free of charge to them, and we thought they may apply this P source like poultry litter up to source to P 120. At 120, 90 percent of the fields should have a soil test P at or above 65.

Q. All right. Let's turn to the second page and look at table 1 on Exhibit 1. Could you tell me what table 1 tells us?

A. This is soil test P calibration for winter wheat, indicates at what soil test P, how much phosphorous fertilizer need to be applied to achieve the optimum use.

Q. All right. And if the soil test P was 40,

THE WITNESS: On the basis of phosphorous, yes.

Q. (BY MR. NANCE) Okay. Let me read the first sentence of the next paragraph. "When P inputs in the form of animal waste, P are managed with the interest of balancing the benefits of food production against risk to the environment, the STP value of 120 clearly differentiates between utilization from disposal."

Did I read that correctly?

A. Yes.

Q. Okay. Let's read the next sentence and then talk about that. "Addition of animal waste to fields testing below 120 involves," and you have underlined "utilizing the waste for beneficial purposes." Did I read that correctly?

A. Yes.

Q. And why is it some beneficial purpose at least up to 120?

A. Just for the reasons we just discussed, to correct the special variability or certain areas below 65 when you have average soil test P at 65.

Q. But do I understand correctly that OSU doesn't recommend putting on fertilizer over 65?

MR. GRAVES: Object to the form.

THE WITNESS: Yes, you're right.

Q. (BY MR. NANCE) Okay. Let me read the next sentence and then let's talk about that. "Addition of animal waste to fields testing above 120 involves," and you have underlined the word "disposal, of the waste without benefit to crop production, but with increased," you have underlined the word "risk to water quality by runoff and erosion." First of all, did I read it correctly?

A. Yes.

Q. Why is it that its disposal of waste without benefit to crop production if it is above 120?

A. Well, when the soil test P is above 120, plants are no longer benefiting from addition of phosphorous. So from the P point of view, there is no need to apply any forms of phosphorous for the reasons we discussed as soil test P, additional P, first of all, will increase soil test P. When soil test P increases, the phosphorous in the runoff is potentially increased, too.

Q. That could increase the risk of eutrophication and other water quality problems; correct?

MR. GRAVES: Object to the form.

THE WITNESS: I would say you're really correct. I would say there is potential risk. If

A. The title is Managing Phosphorous from Animal Manure.

Q. Okay. Before we take this one up, let's think for a moment again about Exhibit No. 1, which was the one we just talked about.

That document was about ten years old, this month?

A. Correct.

Q. Are its conclusions that you and I talked about still valid today in your mind?

A. We have not updated, yes, it is.

Q. But is the science behind that paper still good today?

A. I believe so.

Q. Okay. Let's look at the first paragraph of this document and then we will do as we did before. I will read a sentence and then we will talk about it.

"Land applications," second sentence, "recycle nutrients from manure to soil for plant growth and add organic matter to improve soil structure tilth and water holding capacity." Did I read that correctly?

A. Yes, you did.

Q. In the Illinois River Watershed, Professor, is the poultry litter that's land applied, is it

PRODUCTION TECHNOLOGY

Department of Plant & Soil Sciences
Division of Agricultural Science & Natural Resources
Oklahoma State University

OSU
OKLAHOMA COOPERATIVE EXTENSION SERVICE

PT 98-1 January 1998

EXHIBIT State 1 tabbies

SCIENCE-BASED ANIMAL WASTE PHOSPHORUS MANAGEMENT FOR OKLAHOMA

G.V. Johnson, N.T. Basta, H.A. Zhang, J.A. Hattey, W.R. Raun, and J.H. Stiegler
Department of Plant and Soil Sciences

Executive Summary

Poultry and swine production has created both economic growth in Oklahoma and concern over the effect of excessive land application of animal manure on water quality. Along with economic benefits, producers are faced with disposal of large amounts of animal manure generated from poultry and swine production. Land application of animal manure increases soil P and has raised concerns about P runoff from agricultural land and environmental degradation of streams and lakes.

Several states have proposed standards that would limit manure applications and avoid excessive levels of soil P and reduce impact of P on water quality. Standards may be based on *nutrient utilization* where manure is applied to meet P required for crop production. Standards based on *waste disposal* exceed nutrient P crop requirement and allow for some buildup of soil P.

Several decades of scientific research has documented the relationship between soil P index, crop production, and water quality. Application of manures to soil at P levels required to produce crops minimizes impact on water quality. Science-based fertilizer recommendations used by Oklahoma State University, based on decades of field and laboratory research, show a soil test value of 65 is adequate for production of most crops. Recent research by soil scientists at Oklahoma State University shows that a field-average soil test of 120 can be used to ensure most areas of a field have sufficient P with soil test levels of 65+ and prevent any localized deficiencies due to soil variability. Therefore, *nutrient utilization* standards require that animal manure applications do not result in soil test levels that exceed 120. This will ensure adequate levels of P for crop production and minimize impact on water quality in Oklahoma. Adequate scientific information needed to set risk-based waste utilization standards for Oklahoma is not available at present.

Introduction.

Management of animal waste in Oklahoma has gained interest in recent years as a result of rapid increases in confined-animal waste production. Whether animal waste is considered a resource or not, depends on how it is managed and whether it can be beneficially utilized or is simply disposed of without benefit. Historically, animal wastes have been land-applied to agricultural fields as a beneficial input to crop production. Increased soil organic matter and increased plant available nutrients are recognized as the major benefits. Increasing soil organic matter changes several soil properties, directly and indirectly related to crop production. Therefore, the effect of increasing soil organic matter on crop production has been difficult to quantify. However, the relationship between increasing soil availability of plant nutrients and benefit to crop production has been a subject of widespread scientific inquiry for decades and is well documented. In the scientific processes of improving the understanding of soil availability of plant nutrients and crop response, much has been learned about the fundamental behavior of plant nutrients in the soil. This knowledge also provides a foundation for understanding how soil applied plant nutrients, from any source, might influence the environment.

General Soil-Nutrient Relationships.

The chemical and biological (soil microorganisms) activity of nitrogen (N), phosphorus (P), and potassium (K) in soils causes plant available N to move in the soil in response to water movement, while P and K do not, at concentrations required for

optimum plant growth. Soil immobility of P is a result of orthophosphate precipitation by calcium (Ca) in soils above about pH 5.5 and precipitation by aluminum (Al) and iron (Fe) below about pH 5.5. Nitrogen is mobile because most N is plant-absorbed as the non-precipitating nitrate (NO_3) form, the final oxidation state of organic- and ammonium (NH_4)- N. Consequently, N management for crop production is directly related to crop yield because the total inorganic N present can support plant growth. Management of available P and K is not directly related to crop yield because plants can only extract these immobile nutrients from a thin layer of soil surrounding the root. The total amount of inorganic P and K present is not as important as the concentration of these elements in the soil next to the root surface and the capacity of that soil to replenish P and K in the soil solution when it is removed by plant uptake. Soil tests have been developed to provide an index (Table 1) of the soil capacity to supply adequate amounts of these nutrients during the crop growing season. In addition to identifying the soil-P condition where deficiency is likely to exist (soil test index < 65), scientists also calibrated the soil test to identify probable yield (% sufficiency) when the deficiency exists, and the amount of fertilizer P_2O_5 required annually to correct the deficiency. The soil test P index (STP) is produced using the Mehlich III (M III) extraction procedure in Oklahoma. This method has gradually become a widely adopted technique for estimating plant available P.

Table 1. Calibration of Mehlich-III soil test P for wheat grain in Oklahoma.

P Soil Test Index*	Percent Sufficiency	P_2O_5 (lb/acre)**
0	25	80
10	45	60
20	80	40
40	90	20
65+	100	0

* Value is pp2m soil basis (same as lb/acre numerically).
** Fertilizer input.

Crop Response To Fertilizer-P.

Soil test calibrations, such as Table 1, were developed for Oklahoma and most of the other states more than 20 years ago and involved replicated fertilizer rate experiments on farmers' fields over broad geographic regions. Findings were similar, and current soil test calibrations do not differ markedly from one state to another when similar testing procedures and reporting units are used. Use of soil testing to identify deficiencies and continued annual application of fertilizer-P results in enrichment of plant-available soil-P. A long-term research experiment at the OSU Agricultural Experiment Station at Lahoma, Oklahoma documents the effect of soil-P depletion and enrichment from 27 years of annually applying 0 to 80 lb/acre fertilizer-P for annual winter wheat production (Figure 1). This research also documents the lack of wheat yield response to STP values above 65 (Figure 2).

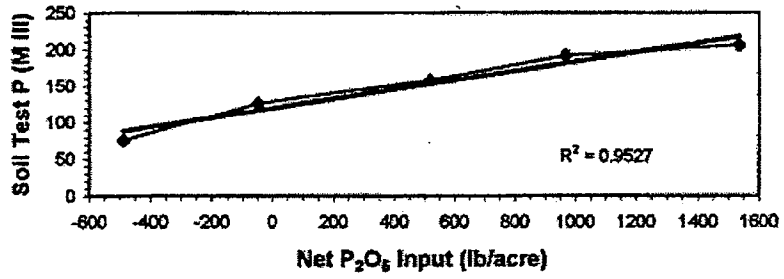


Figure 1. Change in soil test P (pp2m) resulting from 27 years of fertilizer-P input and wheat grain removal (Lahoma 502).

From Figure 1 it can be calculated that a net change of about 15 lb P_2O_5/acre is required to raise (fertilizer-P input) or lower (crop-P removal) the soil test P by a value of 1.0 for this Grant silt loam soil. It is possible to increase STP by simply adding P fertilizer, but Figure 2 shows higher yields do not result from P application when STP is greater than 65.

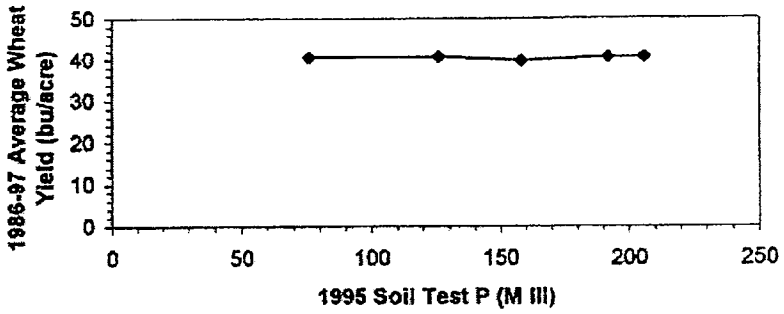


Figure 2. Lack of wheat grain response to soil test P values above 65.

Crops do respond, although slight, to relatively large inputs of fertilizer-P when soil tests are less than 65 as illustrated by Figure 3, showing alfalfa yields in relation to fertilizer-P in a current research study at the OSU Agricultural Experiment Station at Chickasha, Oklahoma. The initial soil test P level averaged about 30, but was quite variable for the site in 1992.

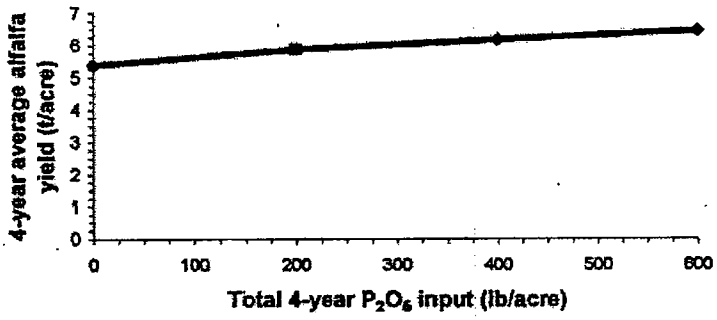


Figure 3. Alfalfa yield response to high rates of fertilizer-P in a P deficient soil (STP = 30) at Chickasha, Oklahoma.

Field Variability.

Recent research, evaluating soil test variability within fields, has identified that portions of a field should respond to fertilizer-P even when the composite soil test for the field is greater than 65. This results from the composite sample, composed of 12 to 15 core samples (0 to 6 inch depth), containing soil from some areas of the field that would be higher than 65 and some areas lower than 65. In order to obtain maximum yield for the entire field it would be necessary to fertilize the field even after the composite sample STP was 65. The STP value, for a composite sample from a variable field may need to be almost double the value of 65 to ensure all P-deficient areas of the field received enough fertilizer P to eliminate P deficiency in the field (Figure 4).

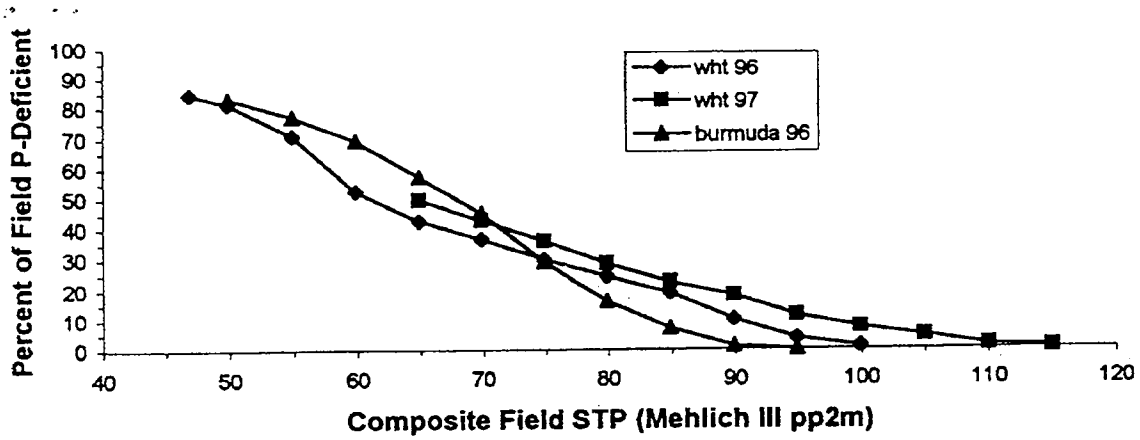


Figure 4. Projected percent of field that would be P-deficient when soil test P value is from a composite for a normally variable field. Field variability estimated from soil testing 250 to 500 areas of each field.

As the soil test P value from a composite field sample increases above 65 the amount of response to fertilizer P addition decreases and the effect of excess P increases when a constant rate of P is applied to the entire field.

Effect of Excess Soil-P.

One of the effects of increasing soil test P is that soil solution P also increases. This has been documented in the past as scientists evaluated forms of soil-P in relation to fertilizer addition and plant response. Recent analysis of samples, selected to represent a broad range of soil test P values for soils submitted to the OSU Soil, Water, and Forage Analytical Laboratory for routine analysis, showed the relationship existed over a wide range of soil test P (Figure 5). The calculated water soluble P at a soil test P value of 65 (regression equation, Figure 5) would be 0.057 ppm P, which is consistent with published values identifying the water soluble P level to support crop needs (Tisdale et al., 1993, p 180).

Since the concentration of water soluble P in soils increases as soil test P increases, it is reasonable to expect the risk to water quality from soluble P will also increase when soil test P increases. Manure application standards based on soil test P levels that exceed crop production needs have been proposed or adopted in several states.

Table 2. Critical levels of soil test P proposed to protect water quality from excessive levels of soil P buildup from manure application.

State	Soil Test Critical Value
Arkansas	150 mg kg^{-1} Mehlich 3 P
Delaware	120 mg kg^{-1} Mehlich 1 P
Michigan	75 mg kg^{-1} Bray 1 P
Ohio	150 mg kg^{-1} Bray 1 P
Oklahoma	130 mg kg^{-1} Mehlich 3 P
Texas	200 mg kg^{-1} Mehlich 3 P
Wisconsin	75 mg kg^{-1} Bray 1 P

Agreement between states on universal soil test critical levels has not been reached for several reasons. Some degree of environmental impact is likely from soils with test P that exceeds crop production levels. However, there is little scientific information that relates soil test P to a known environmental impact. Furthermore, a universal soil test critical level may not have any scientific basis because the environmental impact from soil test P will be watershed dependent. Use of soil test levels that exceed crop production levels require risk-based decisions. However, little data is available to support risk-based standards (Sharpley et al., 1996).

Management of Soil-P Inputs: Utilization vs disposal.

When management of P inputs to soils are considered, two clear outcomes are of concern with any strategy. First there is the traditional management of P inputs to improve crop production

related to the needs for food and feed. Input rates are usually small because of economics when commercial fertilizer is used. Second, there is the recent concern to manage P inputs to minimize risk to surface water quality. Guidelines for P inputs related to crop production are clearly defined by scientific work. When soil test P values are below 65, inputs of fertilizer-P according to soil test calibration are prudent for increased crop production. When fields are known to be variable, crop yields may be further increased by inputs of P until the composite soil test P value reaches about 120. When the soil test P value exceeds 120, there is no longer a benefit to crop production from P addition to the field.

When P inputs, in the form of animal waste-P, are managed with the interest of balancing the benefits of food production against risk to the environment, a STP value of 120 clearly differentiates utilization from disposal. Addition of animal waste to fields testing below 120 involves utilizing the waste for beneficial purposes. Addition of animal waste to fields testing above 120 involves disposal of the waste without benefit to crop production, but with increased risk to water quality by runoff and/or erosion.

As a final consideration, management of P in the form of animal waste or commercial fertilizer should be sensitive to the fact that P comes from natural, nonrenewable reserves of finite size. Current known US reserves of rock phosphate for fertilizer manufacturing have been estimated to be depleted in about 25 years at the current rate of consumption. Unless new reserves are found, recycling of P through the food-feed chain will become increasingly important.

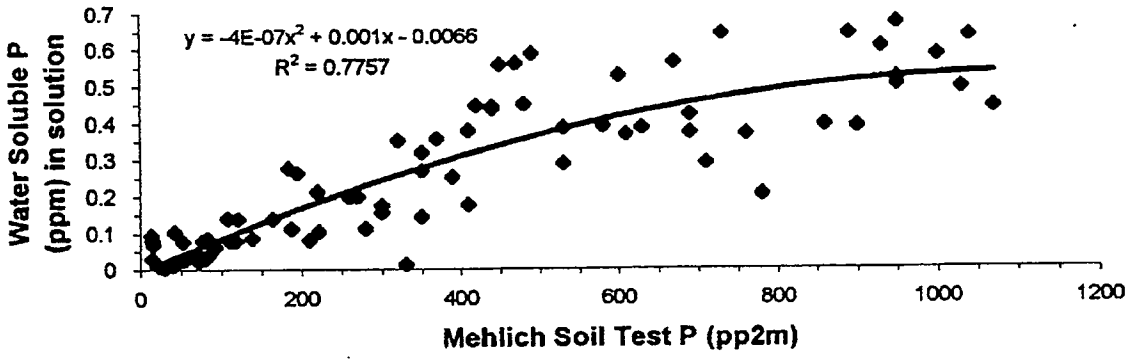


Figure 5. Relationship of soil test P and water soluble P (soil:solution ratio of 1:12.5) selected to represent a wide range of soil test values, from samples submitted to the OSU Soil, Water, and Forage Analytical Laboratory in 1997.

References.

Sharpley, A.N., T.C. Daniel, J.T. Sims, and D.H. Pote. 1996. Determining environmentally sound soil phosphorus levels. J. Soil and Water Cons. 51(2): 160-166.

Tisdale, S.L., W.L. Nelson, J.D. Beaton, and J.L. Havlin. 1993. Soil fertility and fertilizers. Fifth ed. Macmillan Publishing Company, New York.

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF OKLAHOMA

STATE OF OKLAHOMA, ex rel, W. A. DREW EDMONDSON, in his capacity as ATTORNEY GENERAL OF THE STATE OF OKLAHOMA, and OKLAHOMA SECRETARY OF THE ENVIRONMENT C. MILES TOLBERT, in his capacity as the TRUSTEE FOR NATURAL RESOURCES FOR THE STATE OF OKLAHOMA,	§	
Plaintiff,	§	CASE NO. 05-CV-329-GKF-SAJ
V.	§	
TYSON FOODS, TYSON POULTRY, INC., TYSON CHICKEN, INC., COBB-VANTRESS, INC., AVIAGEN, INC., CAL-MAINE FOODS, INC., CAL-MAINE FARMS, INC., CARGILL, INC., CARGILL TURKEY PRODUCTS, LLC, GEORGE'S, INC., GEORGE'S FARMS, INC., PETERSON FARMS, INC., SIMMONS FOODS, INC. AND WILLOWBROOK FOODS, INC.	§	
Defendants.		

EXPERT REPORT OF GORDON V. JOHNSON, Ph.D

1. Introduction

I, Gordon V. Johnson, grew up and lived on a small diversified farm in North Dakota until attending North Dakota State University, where I received a B.S. in agriculture majoring in Soil Science in 1963. I received a M.S. in Soil Science from the University of Nevada (Reno) in 1966 and a Ph. D in Soil Science from the University of Nebraska in 1969. From 1969 to 1977 I taught undergraduate

and graduate classes, and conducted laboratory and field research in nutrient management at The University of Arizona. From 1977 to my retirement in 2004 I served as State Specialist in nutrient management for the Cooperative Extension Service at Oklahoma State University. In this capacity I provided educational programs in nutrient management to OSU County Extension Agents and Area Specialized Agents in Agronomy, and to State, District and Field technical staff of the Natural Resource Conservation Service (NRCS). I also developed, taught, and provided the exams for the statewide Nutrient Management Certification program for NRCS and for the Certified Crop Advisory program for Oklahoma. I have served in many regional and national professional organizations, received numerous achievement awards and published over 100 journal articles and fact sheets on nutrient management. From 1977 to 1990 I served as Director of the Soil, Water, and Forage Analytical Laboratories at OSU. I retired from OSU as Regents Professor of Soil Science and retain Emeriti status. Professional activities, including publications are identified in my attached curriculum vita.

2. Professional Service

a. I have been retained by the State of Oklahoma to evaluate:
   i. The agronomic reasonableness of poultry litter application to land in the Illinois River Watershed (IRW);
   ii. Behavior of phosphorus in soils and the environment.
   iii. Phosphorus (P) as an essential macronutrient for plants.
   iv. Nutrient Management.
   v. Litter as a P nutrient source.
   vi. STP and P management in the IRW.
   vii. Soil amendments.
   viii. NRCS 590 and P index use.
   ix. STP and soluble P in field runoff.
   x. Litter land application practices.

Agricultural practices are considered "agronomic" if the practices are essential to effective and economic soil management and crop production. As a result of my study, research, and teaching of nutrient management for agronomic crops, I am familiar with the soils and crops in the Illinois River Watershed. I have presented educational programs on nutrient management to land owners and operators of farms in the Illinois River Watershed and I am familiar with their practice of application of poultry litter to pasture and hay (forage) fields. My rate of compensation is $110 per hour and I have billed a total of $81,573.07 to date. In rendering my opinions I am relying on my career professional experiences and scientific literature that I have reviewed and considered. I have testified in no other cases, either by trial or deposition, within the past four years.

3. Behavior of Phosphorus in Soils and the Environment.

a. Elemental P does not exist in nature, and is only a phenomenon of the laboratory and industry. White elemental P is a very reactive solid at room temperature and must be stored under water to prevent its reaction with oxygen (O_2). When exposed to the atmosphere it reacts violently with O_2. In nature P exists in combination with oxygen as the oxy-anion, orthophosphate (PO_4^{3-}), which is relatively stable, but bound with cations to form a variety of compounds. When hydrogen (H^+) is the only cation (laboratory situations), phosphate is present in the moderately strong phosphoric acid, H_3PO_4.

b. In soil solutions, PO_4^{3-} will react with whatever cations have the highest charge and are present in highest concentration. A deciding factor in what compound will eventually be formed by reacting with PO_4^{3-}, is the stability of the final compound formed. Thus, because aluminum phosphate ($AlPO_4$) and iron phosphate ($FePO_4$) are extremely stable, they are formed in soils acidic enough to cause aluminum (Al^{3+}) and iron (Fe^{3+}) to dissolve and be present to react with PO_4^{3-}. In soils where the pH is above 5.5 there is enough calcium (Ca^{2+}) present to form calcium phosphates, the least soluble (most stable) being rock phosphate or the mineral apatite ($Ca_5(PO_4)_3OH$). Rock phosphate is mined commercially from geologic marine deposits and is the primary raw material from which commercial fertilizer is manufactured.

c. Whenever fertilizer is added to soils the soluble phosphate will begin to react with calcium present in the soil to form various calcium phosphates of low solubility (plant availability) the final product (after about two years) being rock phosphate. In soils of pH suitable for plant growth (pH 5 to 8), the hydrogen (H^+) concentration in the soil solution is very low (1×10^{-5} to 1×10^{-8} mole/liter). These concentrations allow small amounts of PO_4^{3-} to be present in combination with H^+ in the form of $H_2PO_4^-$ and HPO_4^{2-}, the ionic forms of P taken up by plants.

d. Soils typically contain forms of organic and inorganic P in total amounts ranging from about 200 to 6,000 lb/acre. As plants grow they absorb inorganic water soluble P from the soil. Water soluble P removed by plants is repeatedly replenished by chemical transformation of less soluble forms of P in the soil to water soluble forms as a result of mass-balance, chemical equilibrium reactions.

4. Phosphorus (P) as an essential macronutrient for plants.

333 (also 5 times the ACL), with 90 % above 65 and only 3 % less than 40. Additionally, the average available N was 16 for the samples associated with Tyson and 88 lb N/acre with samples associated with Georges, indicating a long practice of excess N and P input to these soils. Application of poultry litter sufficient to raise STP and available N to these levels is not a reasonable agronomic practice. Rather it indicates that such poultry litter application was disposal of waste. As a comparison, where land application of poultry waste is not common, as in 18 eastern Oklahoma counties where litter production is less than 1,000 tons per year, the average STP is 38 lb P/acre for the 2004-2006 period (OSU soil testing lab STP data and 2002 Census of Agriculture poultry production data, see Excel data files).

d. I have also examined results of soil tests from the public soil testing labs at the University of Arkansas and Oklahoma State University for the last three years data from counties within which the IRW resides (Benton and Washington counties in Arkansas and Adair, Cherokee, Delaware and Sequoyah counties in Oklahoma). These samples represent all samples collected within each county from fields identified for forage production. Therefore this collection of samples would be expected to include fields that have historically had P input from poultry litter, those with historic input of P from commercial fertilizer, and those that may be sampled for the first time to diagnose production problems. Commercial fertilizer is likely used when fields are not close to a source of poultry litter. Because commercial fertilizer-P is more costly than litter-P, farmers generally do not apply more than will be beneficial for the crop and STP values are generally maintained near 65 (as indicated in (6d) above, by the average STP of 38 for 18 eastern Oklahoma counties where annual litter production is less than 1,000 tons.) To the extent commercial fertilizer is used instead of poultry litter-P in these counties, the county average STP will be less than what is reported for fields receiving poultry litter-P (paragraphs (6b) and (6c) above). Nevertheless, even for these county-wide results, the average STP was 402 lb P/acre and 90 % of the 6558 samples from Arkansas counties from 2005 to 2007 had STP values in excess of 65 lb/acre, and 96 % had values greater than 40 lb/acre, the 95% crop yield sufficiency level (Arkansas soil testing lab). Results from the Oklahoma counties for 2005 to 2007 had an average STP of 102 lb P/acre and showed that of 4,216 samples, 78 % had values greater than 65 and 83 % had values greater than 40 lb/acre (OSU Soil, Water and Forage Analytical Laboratory, annual summaries).

e. The Arkansas legislature recently passed new laws that went into effect on January 1, 2006. These laws require STP analysis before poultry litter can be land applied. The effect of this legislation became evident in review of

soil test results for Benton and Washington counties. From 2000 to 2005, the average number of soil samples tested each year associated with forage production, was 299 and 223 for Benton and Washington counties, and the average STP values, although more than double the ACL of 65, were 174 and 140, respectively. The total number of samples increased dramatically in 2006 and 2007, to an annual average of 1088 for Benton County and 1803 for Washington County. The respective STP values also greatly increased and averaged 453 and 426 respectively. The upper 25 % of samples averaged over 900 lb P/acre, with the highest 17 samples exceeding 3,000 lb P/acre. Phosphorus deficiency (i.e., less than 65 STP) was indicated for only 5.0 % of the samples for Benton County and 8.3 % of the samples for Washington County. Although the results for these two years still include samples outside of the IRW and samples where commercial fertilizer is the source of nutrients, the dramatic change in number of samples is a result of newly required tests where poultry litter has been, and was intended to be, applied. The dramatic increase in average STP values, which are more than six times the adequate level for crops, and the presence of such astronomically high soil test results, is a clear indication excessive poultry litter P has been applied in the past and fertilizer P is no longer needed for the vast majority (93 %) of these fields.

f. I have reviewed the Arkansas Natural Resources Commission annual reports that record STP values associated with comprehensive nutrient management plans developed for land application of litter.

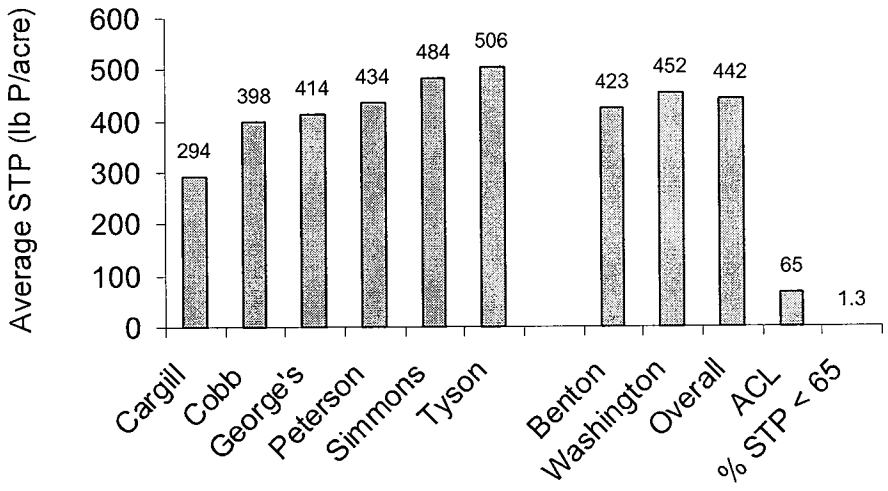


Figure 4. Soil test P values from Arkansas Natural Resources Commission registry for litter management, 2007. Integrators were identified only for Benton County.

This data represents STP values for fields where poultry litter waste was being land applied in the IRW in 2007 by growers associated with the indicated integrators. Overall there were 224 STP values expressed as "Avg. P Level". Each "Avg. P Level" often representing several hundred acres. For example, an "Avg. P Level" of 539 lb P/acre was identified with 886 acres associated with the integrator Cargill. Similarly, an "Avg. P Level" of 761 lb P/acre was associated with 500 acres for a Tyson grower(s).

g. I have also reviewed recent studies by the USDA that have examined the capacity of counties to assimilate nutrients from animal manure. Using animal census data from 1982 and 1997 these USDA studies have shown that nationally over 50 % of the on-farm excess N and P is from poultry production (Gollehon, et al., 2001) An estimated 97 % of the animal manure produced and land applied in the IRW is poultry litter (from 2002 Census of Agriculture livestock data). Using 1997 data, the USDA concluded categorically that between 75 -100 % of the on-farm N and P from animal manure generated in Washington and Benton Counties in Arkansas and Delaware County in Oklahoma was in excess of the farms' ability to reasonably assimilate the nutrients as fertilizer. Adair, Cherokee and Sequoyah counties in Oklahoma were categorized as 50 – 75 % in excess of the farms' ability to agronomically assimilate the nutrients (Confined Animal Production and Manure Nutrients. USDA 2001. pg 25-26; Fig 25-26.). This 1997 "excess" of these nutrients is now likely to have become even greater because poultry production has increased since 1997 and IRW soils have become more nutrient saturated. The government studies did not consider available soil nutrients identified by current soil tests, and thus are conservative estimates of the P excesses.

h. A recent study relating N and P inputs from fertilizer and manure, removal by harvested crops, and the balance of deficiency or excess was conducted in Arkansas (Slaton, et al., 2004). Separating the state into nine districts, the five-year study concluded that poultry litter accounted for 96 % of the total manure-derived N, P, and K in the state. They also concluded that although forage uptake of P is high for areas of western Arkansas where poultry litter production is greatest, "nutrients removed by forage crops are usually fed or recycled on-farm rather than exported outside the district boundaries". They further stated that "...most soils used for warm-and cool-season grass production in Arkansas already have adequate Mehlich 3-extractable P levels that do not require additional P fertilization for forage production..." With regard to the balance of inputs

and removal of P they concluded "The greatest excess of N and P exists in District 1 ..." within which Benton and Washington counties are included. They also concluded that "The results from this assessment may help reinforce the thought that current nutrient application strategies in western Arkansas are not sustainable without the danger of creating and/or exacerbating water quality issues from excessive nutrients. Transport of excessive N and P contained in poultry litter outside of the central and western Arkansas districts that have restricted land area available for nutrient application is needed if the current poultry production levels are to be maintained." Similar to the USDA study in (g.) above, they did not consider soil contributions to provide crop P when they calculated the balance between manure inputs and crop removal and, consequently, the statements of excess P are greatly underestimated.

i. Based upon my review of the above STP values and reports of nutrient excesses, it is clear that land application of poultry litter has led to excessive P build-up in land within the IRW. The need for additional widespread land application of poultry litter as a P fertilizer does not exist. Almost all continued land application of poultry litter within the IRW should be judged as a waste disposal practice rather than fertilization. Given the low percentage of fields with STP values less than 65 and the large amount of litter produced in the IRW, most of the litter should not be applied within the IRW. Very few forage fields in the IRW would reasonably require additional application of poultry litter under good agronomic practices.

8. Soil amendments.
   a. Amending soils is a practice where materials are added to soils to correct conditions that have been identified as limiting normal soil productivity. Under State law, only materials that are proven to correct these limiting conditions may be licensed as soil amendments (Oklahoma Soil Amendment Act). Unmanipulated animal manures are specifically excluded from the definition of soil amendments . Additionally, to be effective, soil amendments must typically be incorporated into the soil by tilling and used to correct an identified production-limiting, soil property. Land application of poultry litter to pasture and hay land in the IRW usually involves only surface spreading without tilling. Consequently, land application of litter in the watershed does not qualify as a soil amending practice and it is unlikely that significant non-fertilizer benefits could be obtained.

9. NRCS 590 and P index use.
   a. I have examined the NRCS Code 590 guidelines and the use of phosphorus indexes (PI) in the Southern Region of the US. Most of the

UNITED STATES DEPARTMENT OF AGRICULTURE

FARM SERVICE AGENCY

FINAL

Programmatic Environmental Assessment for Implementation of the Conservation Reserve Enhancement Program Agreement for Oklahoma

July 2006

- Restore riparian vegetation to stabilize stream banks and help reduce bank erosion
- Restrict livestock access to floodplains to decrease overland flow of pathogens to streams, and to decrease stream bank erosion and the subsequent sediment loading of streams
- Encourage landowners to view riparian protection as a standard practice of land management.

1.3 Objectives

CREP agreements are designed to meet specific regional conservation goals and objectives related to agriculture. The proposed agreement with Oklahoma is focused on improving water quality in two high priority watersheds in eastern Oklahoma, the Illinois River/Lake Tenkiller and the Spavinaw Lake watersheds (herein referred to as the *Tenkiller* and *Spavinaw watersheds*) (Figure 1). These watersheds were selected for participation because their water quality problems are representative of other watersheds within the region and they would serve to demonstrate the benefits of riparian protection for acceptance by landowners across the region.

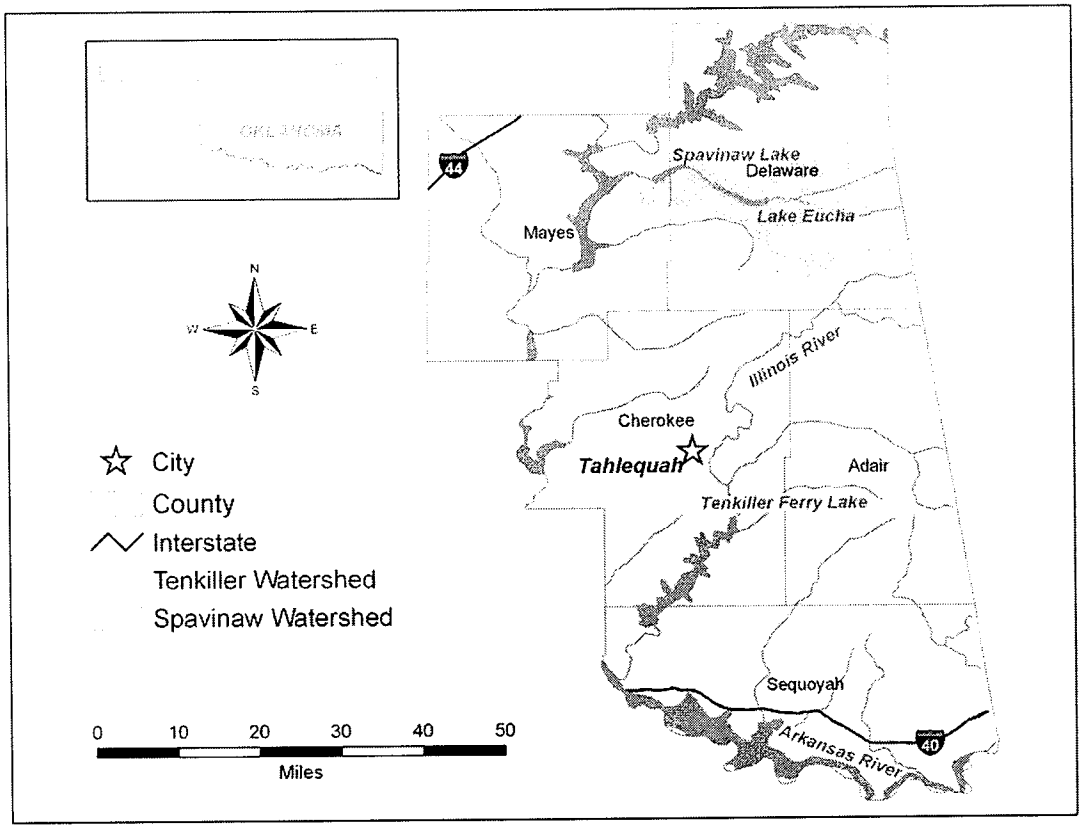


Figure 1. Oklahoma watersheds proposed for CREP enrollment.

Water quality problems in the Tenkiller and Spavinaw watersheds are due to excess nutrients, pathogenic bacteria, and sedimentation. These watersheds are major poultry growing and cattle producing areas, and a common practice has been to fertilize the soil for grazing purposes by applying poultry litter. This practice has led to the excessive buildup of phosphorus that currently pollutes waterbodies in the ROI. Excess nutrients have also caused low dissolved oxygen levels in these

Table 11. TCPs within the ROI.

County	Watershed	Number of Properties	Traditional Cultural Properties
Adair	Tenkiller	1	Westville: Reverend Jesse Bushyhead Grave
Cherokee	Tenkiller	2	Park Hill: Ross Cemetery Tahlequah: Illinois Campground
Delaware	Spavinaw	1	Jay: Polson Cemetery

Source: OSHPO 2005a

3.3 Water Resources

3.3.1 Surface Water

3.3.1.1 Description

Surface water includes rivers, streams, and lakes, including those designated as impaired. The ROI for this resource analysis includes land within the Tenkiller and Spavinaw watersheds proposed for CREP enrollment and described in Section 1.3.

3.3.1.2 Affected Environment

Section 303(d) of the *Clean Water Act* establishes water quality standards and every two years States must compile a list of waterbodies within their jurisdiction that do not meet these standards (33 USC 26 parts 1251 et seq., 2000). These lists, which identify the impairments to each waterbody, are commonly known as *303(d) lists*. Once the list is complete, each jurisdiction must then determine priority rankings for these waters and establish total maximum daily loads (TMDLs) for each. A TMDL is the maximum amount of pollutants a waterway can receive daily and still meet water quality standards (EPA 2005b). Impairments to waterways within the ROI include the presence of phosphorus and nitrates, low dissolved oxygen content, pathogens, and high levels of turbidity (Table 12). A listing of all waterbodies within the ROI is provided in Appendix E.

The number one cause of water impairments within the ROI is excessive nutrient loading (EPA 2002a). This is due in large part to the practice of fertilizing grazing land by applying poultry litter. Within the Tenkiller watershed, Baron (Barren) Fork, Caney Creek, Flint Creek, Illinois River, and Tenkiller Ferry Lake are listed as impaired due to an excess of phosphorus, and Sager Creek is impaired due to excess nitrates (Table 12). Lake Eucha and Spavinaw Lake in the Spavinaw watershed are also impaired due to high levels of phosphorus (Table 12) (EPA 2002a). The loading of nutrients can instigate eutrophication, which causes waterways to age in succession prematurely and triggers excess plant growth, such as algae blooms and aquatic weeds. Algae blooms occur naturally but with more frequency and severity in the presence of nutrients (NRCS 1994). When the algae die, they sink to the bottom of the waterway which often stimulates an increase in bacteria and other decomposers. As these decomposers increase in numbers, they deplete the dissolved oxygen supply within the waterway (NRCS 1994). Sometimes the respiration from the algae growth creates enough oxygen to offset the use of the oxygen by the decomposers. If there is not a balance, eutrophication can occur. An excess of nutrients can contribute to a variety of other water quality issues, such as decreased water clarity, fish kills, and a bad taste and odor to the water (NRCS 1994).

IN THE UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF OKLAHOMA

W.A. DREW EDMONDSON, in his capacity as ATTORNEY GENERAL OF THE STATE OF OKLAHOMA and OKLAHOMA SECRETARY OF THE ENVIRONMENT, C. MILES TOLBERT in his capacity as the TRUSTEE FOR NATURAL RESOURCES FOR THE STATE OF OKLAHOMA,

Plaintiff,

vs.

TYSON FOODS, INC., et al.,

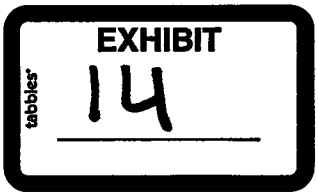
Defendants.

4:95-CV-003290-TCK-SAJ

(VOLUME I)

- -

VOLUME I OF THE VIDEO DEPOSITION OF ROBERT JAN STEVENSON, Ph.D., produced as a witness on behalf of the Defendants in the above styled and numbered cause, taken on the 8th day of January, 2009, in the City of Tulsa, County of Tulsa, State of Oklahoma, before me, Karla E. Barrow, a Certified Shorthand Reporter, duly certified under and by virtue of the laws of the State of Oklahoma.



Q Yes.

A About effects of nutrient pollution on aesthetics and species composition of biota and streams is described in the background section along with the definitions of terms. In subsequent sections of this report, I will describe the results of field studies in which we show high nutrient concentrations in streams of the IRW, significant relationships between P concentrations and poultry house density, significant and substantial direct and indirect effects of poultry house density and nutrients on algal biomass, dissolved oxygen, DO, and pH, and significant and substantial direct and indirect effects of the above causal factors, poultry house density, phosphorus, algal biomass, DO, and pH on the species composition of algae, invertebrates and fish. Throughout the report there is extensive reference to similar findings in other studies that have been published in the peer reviewed scientific literature. 11:28 11:28 11:29 11:29

Q And that's under a heading of objectives; correct?

A Yes.

Q Who decided that these bulleted items would be the objectives of your work in this case? 11:29

from some agency, state agency people that were involved in the sampling crews, the review of historical sampling results and literature and the modeling that you did?

MR. PAGE: Object to the form. 11:32

A It sounds generally like what I did, yes.

Q (By Mr. Graves) Okay. And then did you also rely on the results of Dr. Engel's modeling?

A Yes, I did.

Q Are you going to be offering opinions in this case on the nutrient concentrations in the streams of the Illinois River watershed? 11:32

MR. PAGE: Object to the form.

A Yes.

Q (By Mr. Graves) And what are those opinions? 11:32

A My opinions are that the nutrient concentrations in the Illinois River watershed are very high. They are higher than other regions that I've done research in the United States, which includes many areas. I do a lot of work with the 11:33 EPA's nutrient criteria group, review a lot of literature. I've done studies like this before. These are higher nutrient concentrations for a watershed as a whole than any other watershed that I've had experience with. 11:33

Q And where were the other studies conducted where you were analyzing nutrient concentrations and whether they were high or low?

A Okay. One of them is in Kentucky. We did a survey of about 70 streams in Kentucky, and in a joint project with 70 streams in Michigan. It was an EPA funded project back in 1996. I've done extensive work on the Muskegon watershed in Michigan. I've worked on about 70 or so springs -- do you really want me to list all of these? Basically --

11:33

11:34

Q Where you were analyzing nutrient concentrations and where they were --

A Almost around the entire United States. The state of Florida, large EPA projects in the Mid-Atlantic region. I've worked in -- so I have been part of the national assessments with the EPA. I've helped the EPA develop nutrient criteria. So in the national assessments, or -- and with the United States Geological Survey. So we -- one of the major projects was a survey of hundreds of streams, I think 600 streams in the Mid-Atlantic region, which would have been Pennsylvania, New York, West Virginia, Maryland, and the nutrient concentrations in the Illinois River watershed

11:34

11:34

11:35

are -- so a ballpark number is that 25 percent of the streams in the Illinois River watershed have newer nutrient concentrations than maybe the highest 1 to 2 percent in the whole Mid-Atlantic Highlands. In other words, the nutrient concentrations in the Illinois River watershed are high. 11:35

I've worked in prairie streams in North and South Dakota, and the nutrient concentrations there are pretty high. They're similar to this concentration, but the -- but they are a completely different kind of stream than the streams that drain the geology of the Illinois River watershed, and natural concentrations there are higher compared to impacted concentrations, whereas natural concentrations here are around 10, and we're commonly seeing above a hundred micrograms per liter phosphorus in the Illinois River watershed. That's a very high concentration of phosphorus. That's higher than most other streams anyplace where you have a geology and a hydrology like the streams of the Illinois River watershed. 11:35 11:36

Another major project that I worked on was both the EPA -- an EPA -- a double project that was funded where we looked at almost 3,000 streams in the western U.S., and the data from that is also an 11:36

element of what I think of when I think about are the nutrient concentrations in the Illinois River higher or low. But I control for -- what's important is the control for the geology and the hydrology that the natural features of the Illinois River watershed, when you think about the nutrient concentrations. 11:36

Q Were any of these previous studies that you've been involved in in the Ozark Highlands ecoregion?

A No. 11:37

Q Do you know whether the urban population has a ratio or percentage of the land area of those other watersheds, do you know if they were similar at all to the Illinois River watershed?

A I think they are actually greater. For example, in the project that I did in Kentucky, the 70 streams that we studied, which are very much like the ones here in the Illinois River watershed, ranged from those that were in downtown Louisville, Kentucky, which is twice the size of Tulsa, and in the metropolitan area throughout that. It was pretty much in driving distance of the University of Louisville. 11:37

Q Do you know whether the urban location spatially within the watershed was similar at all to 11:38

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF OKLAHOMA

W. A. DREW EDMONDSON, in his capacity as ATTORNEY GENERAL OF THE STATE OF OKLAHOMA and OKLAHOMA SECRETARY OF THE ENVIRONMENT C. MILES TOLBERT, in his capacity as the TRUSTEE FOR NATURAL RESOURCES FOR THE STATE OF OKLAHOMA,

Plaintiff,

vs. 4:05-CV-00329-TCK-SAJ

TYSON FOODS, INC., et al,

Defendants.

- -

VOLUME II OF THE VIDEOTAPED DEPOSITION OF DENNIS COOKE, PhD, produced as a witness on behalf of the Defendants in the above styled and numbered cause, taken on the 5th day of December, 2008, in the City of Tulsa, County of Tulsa, State of Oklahoma, before me, Lisa A. Steinmeyer, a Certified Shorthand Reporter, duly certified under and by virtue of the laws of the State of Oklahoma.

A Yes.
Q Okay. Why was Broken Bow eutrophic in 1997?
A All we have is a single sample from that year, so really very, very limited data. I cannot explain why that sample produced that result. If we look at the amount of rainfall in that particular quarter of the year, it was real high. 08:42AM
Q How do you know that?
A I looked at the National Weather Service rainfall records, which Robert van Waasbergen got for me. 08:42AM
Q Is that in your report anywhere?
A Nope, it's not, but I'm trying to find an explanation for that, and so there was some wash off from the land, but that's a single sample, and that's the only thing that I can say is that we possibly have an anomaly there because it does not correspond to the data that were obtained by CDM or by OWRB in other years at all. 08:43AM
Q But clearly, you say in your report that Broken Bow was eutrophic in 1997; correct? 08:43AM
A I do.
Q Is this not your reference reservoir with little impact from what you interpret as pollution from poultry litter? 08:43AM

A That's correct, and I said it was eutrophic in 1997. There's no way that I'm going to manipulate data and make a statement it isn't so, but in every other year we looked at it, it's oligotrophic.

Q That who looked at it? 08:43AM

A That Dr. Welch and I looked at it.

Q You said yesterday, of course, you've never been there. You talking about looking at data?

A Yes.

Q If you took, Dr. Cooke, the poultry out of the 08:43AM Illinois River watershed but left the people, the cattle and all the wastewater treatment plants and the various other land uses that exist in the watershed, what kind of trophic conditions would you expect in Lake Tenkiller? 08:44AM

A At this point if we did that today, and that's what you're asking, if I could just some way or another erase the poultry from the watershed today?

Q Yes, uh-huh.

A I think we would see eutrophic conditions in 08:44AM Tenkiller for a long time because the soil is so saturated with poultry waste, way above agronomic need maybe by a factor of four or five on average, so the soils are releasing large amounts of phosphorus and would continue to do so for a long 08:44AM

IN THE UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF OKLAHOMA

W. A. DREW EDMONDSON, in his capacity as ATTORNEY GENERAL OF THE STATE OF OKLAHOMA and OKLAHOMA SECRETARY OF THE ENVIRONMENT C. MILES TOLBERT, in his capacity as the TRUSTEE FOR NATURAL RESOURCES FOR THE STATE OF OKLAHOMA,

Plaintiff,

vs. 4:05-CV-00329-TCK-SAJ

TYSON FOODS, INC., et al,

Defendants.

VOLUME I OF THE VIDEOTAPED DEPOSITION OF CHRISTOPHER TEAF, PhD, produced as a witness on behalf of the Defendants in the above styled and numbered cause, taken on the 30th day of July, 2008, in the City of Tulsa, County of Tulsa, State of Oklahoma, before me, Lisa A. Steinmeyer, a Certified Shorthand Reporter, duly certified under and by virtue of the laws of the State of Oklahoma.

health of the citizens of Oklahoma in regards to water quality issues; is that true?

MR. PAGE: Object to the form.

A I don't have any independent knowledge of what they think. I think, practically speaking, that's what they do. 10:09AM

Q Do you have any information that they are not discharging that responsibility --

MR. PAGE: Object to the form.

Q -- in an effective manner? 10:09AM

A No.

Q How many people have gotten cancer from drinking water in the IRW?

A I don't think anybody can answer that question. These are carcinogens. They're regulated as such, and if this were a clean-up site in Oklahoma or elsewhere, my expectation is that these numbers in many instances would require clean-up. 10:09AM

The venue here is different. The venue is The Clean Water Act, which has particular obligations and requirements, some of which involve cost and technical feasibility, which require that values that might be recommended strictly on a toxicological basis are not achieved because of cost and technical feasibility. It's a balancing act 10:09AM 10:10AM

Q Okay. Then let me rephrase the question so we have a clear Record, and I'm basing this on Paragraph 11 of your report. Your opinions regarding impairment and health hazards in the Illinois River watershed are related to three classes of hazards, pathogens, cyanobacteria and chemical disinfection byproducts; is that correct? 03:13PM

A Yes.

Q Are you going to offer an opinion at trial to a reasonable degree of scientific certainty that there is any person or persons who have in fact become ill from consuming groundwater in the Illinois River watershed? 03:13PM

A I will be providing opinions that the conditions that have been detected make that likely. I don't have an individual's name, no. 03:14PM

Q And to test that opinion, would we have to undertake a rather involved study, as you mentioned previously, on the contact?

A In my opinion, we would, and I think we talked about that at length. 03:14PM

Q All right. Of these -- of the water wells that are listed on your exhibit -- you might be able to find it better -- quicker than I.

A I'm sorry. I didn't hear what you said. 03:14PM

IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF OKLAHOMA

W. A. DREW EDMONDSON, in his capacity as ATTORNEY GENERAL OF THE STATE OF OKLAHOMA and OKLAHOMA SECRETARY OF THE ENVIRONMENT C. MILES TOLBERT, in his capacity as the TRUSTEE FOR NATURAL RESOURCES FOR THE STATE OF OKLAHOMA,

Plaintiff,

vs. 4:05-CV-00329-TCK-SAJ

TYSON FOODS, INC., et al,

Defendants.

- -

THE VIDEOTAPED DEPOSITION OF BERNARD ENGEL, PhD, produced as a witness on behalf of the Defendants in the above styled and numbered cause, taken on the 15th day of January, 2008, in the City of Tulsa, County of Tulsa, State of Oklahoma, before me, Lisa A. Steinmeyer, a Certified Shorthand Reporter, duly certified under and by virtue of the laws of the State of Oklahoma.

MR. PAGE: Before you begin your questioning, Mr. George, could I have a copy of the exhibit?

MR. GEORGE: Sure, sure. It will make its way around. Do you have another one? Sorry. 10:42AM

MR. ELROD: Where did you put your X?

MR. GEORGE: Right here.

A Not everybody has got an X.

MR. ELROD: Here by the letter D, lower right D, watershed? 10:42AM

MR. GEORGE: Correct, a little below, below and to the right.

MR. GRAVES: It's kind of at the intersection of those two.

MR. GEORGE: Right, right. 10:42AM

MR. ELROD: I know that piece of grass.

MR. GEORGE: Maybe you can tell us something about it, John.

Q Mr. Engel, you recognize that in this watershed, from your own analysis and information 10:42AM available to you, poultry litter is not land applied on every parcel but is applied on particular parcels of land; correct?

A Yes.

Q Okay, and have you, sir, as the fate and 10:43AM

FROM THE DESK OF

Monty Henderson
President/COO

GEORGE'S® INC

Two of the top issues that have received a lot of attention for the past several months are litter management and dead bird disposal. For years litter has been a valuable by-product and through it's use as fertilizer it has helped the cattle business to flourish in western Arkansas & southwestern Missouri. Over the years however, studies indicate that continuous use on the same land can increase the phosphorus levels in the soil to levels higher than annual crops can utilize. These studies indicate that in certain watersheds the excess can dissolve into run-off rainwater and get into the streams creating an imbalance in streams and rivers.

The regulatory agencies, both state and federal, have become involved and are looking at regulating the amount of phosphorus that can be applied per acre based on the current level of phosphorus in the soil, the amount necessary for growth of forage and the proximity to certain streams. Our industry is better served to develop voluntary litter management plans and to cooperate with state and federal government in being good stewards of our soil and water rather than waiting for regulation. As most of you know, these voluntary plans are currently being developed.

Once the soil testing is done, we may find that a lot of litter may have to be transported to other parts of the country where fertilizer is not so plentiful and is needed for producing pasture and crops. There are currently some processes being developed to pellet litter making it more cost efficient to transport and easier to handle. These processes also allow for nitrogen or potash to be added making it a "complete" fertilizer that may be perfect for row crop farmers to use in the mid-west and other farming areas. This may be the win-win solution to getting these nutrients disbursed out of our area and into areas where they are needed.

In England a lot of excess litter is being used as fuel to generate electricity. Currently this process is not competitive with the cost per kilowatt that we pay for our electricity. In the future however, depending on what other alternatives are available, this may be a viable solution to eliminating litter.

Dead bird disposal has always been a liability. Whether you are using an incinerator to burn them or composting them, there is a cost associated with disposal. Some states currently do not allow incineration due to air quality standards and most states have eliminated the use of pits due to the risk of pollution of the ground water.

As you know, we are evaluating various methods of getting dead birds to a rendering plant. Due to the fact that transporting them is high cost and since the birds themselves produce low value protein, this also is a liability. When you compare the cost of operating a freezer to the cost of operating an incinerator, however, this may be the lowest cost alternative on the farm. Also, as state and federal regulations change, we may find that our list of alternatives will decline. As growers we do have a responsibility to dispose of our dead birds in a legal, environmentally responsible manner.

George's will continue to keep you informed of any new innovations or regulations that relate to litter management and dead bird disposal.

(The Eggstra News continued from page 10)

an egg. Dirty eggs are rerouted automatically back through the washer. The check or crack detector separates the checked eggs from those without a flaw. The system is exceedingly superior to the human eye.

John Lossing is happy to announce Braums and Quality Foods, as new customers. "We plan to use our new facility to its total potential in making George's and its customers the VERY BEST!"

Our telephone system is expected to be in good working order soon. We have asked our customers and coworkers to please bear with us.

Casey has been overseeing the total transition during the past several weeks. You could find him on the premises even at 3 AM, checking to make sure the new equipment was operating properly in the Turbo House and that the temperature was satisfactory. He has been right beside each of us, offering his support and guiding the operation through the many obstacles, resulting in a smooth transition. Our hats are off to you Casey!

EXHIBIT
tabbies
18

IN THE UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF OKLAHOMA

W. A. DREW EDMONDSON, in his capacity as ATTORNEY GENERAL OF THE STATE OF OKLAHOMA and OKLAHOMA SECRETARY OF THE ENVIRONMENT C. MILES TOLBERT, in his capacity as the TRUSTEE FOR NATURAL RESOURCES FOR THE STATE OF OKLAHOMA,	)
Plaintiff,	)
vs.	) 4:05-CV-00329-TCK-SAJ
TYSON FOODS, INC., et al,	)
Defendants.	)

- -

THE VIDEOTAPED DEPOSITION OF MONTY HENDERSON, produced as a witness on behalf of the Plaintiff in the above styled and numbered cause, taken on the 20th day of August, 2008, in the City of Fayetteville, County of Washington, State of Arkansas, before me, Lisa A. Steinmeyer, a Certified Shorthand Reporter, duly certified under and by virtue of the laws of the State of Oklahoma.

Q Would that include the work done by the U. S. Poultry & Egg or Southeast Poultry & Egg?

A Don't remember. Could have been. Could have been something that they were involved with. It was in 2005, and at that time we were actively involved in hauling litter and in investigating all of these other options for use of litter that I mentioned earlier. 11:49AM

Q Okay. Down the -- not the next sentence but the one after you write, the problem comes when more litter is used than the crops need and phosphorus levels become too high in the soil. Now, what are you talking about now? 11:49AM

A Well, I'm just quoting some science that I had read and listened to at different -- from different scientists who were doing work with soil phosphorus and nitrogen. 11:50AM

Q You concluded that to be true, though, from listening to them I take it?

A Well, we obviously concluded that it had to have some basis or we wouldn't have been hauling litter and making investments at that time in alternate sources for litter. 11:50AM

Q You wouldn't have written to all of your customers and employees if you didn't believe it was 11:50AM

true, would you?

A That's correct.

Q Okay, and what -- let's go on to the next. It goes on -- you go on and write during major rain events, some of the phosphorus becomes soluble and washes off into the streams and lakes. At this point you were convinced that was true, didn't you? 11:51AM

A Based on the science that I was reading at the time, I was accepting that.

Q Okay. Then we go to the conclusion of this where if you look in the third column and there's a sentence which at that far right margin, which begins with whatever the solution or a combination of solutions, the excess litter must be redistributed out of the concentrated poultry areas. 11:51AM We at George's are currently looking for solutions to this problem and will work closely with our growers in solving this problem. It is a problem that must be solved very soon. You see that?

A Uh-huh, and we were taking action exactly along those lines at that time and continue to today. 11:52AM

Q Well, you already had your litter hauling program where you were hauling the litter out, and at that point you were still saying it is a problem 11:52AM

IN THE UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF OKLAHOMA

W. A. DREW EDMONDSON, in his capacity as ATTORNEY GENERAL OF THE STATE OF OKLAHOMA and OKLAHOMA SECRETARY OF THE ENVIRONMENT C. MILES TOLBERT, in his capacity as the TRUSTEE FOR NATURAL RESOURCES FOR THE STATE OF OKLAHOMA,

Plaintiff,

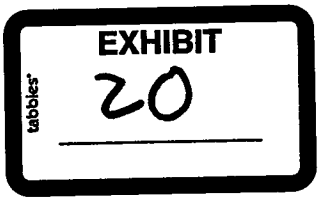
vs. 4:05-CV-00329-TCK-SAJ

TYSON FOODS, INC., et al,

Defendants.

- -

THE VIDEOTAPED DEPOSITION OF RONALD MULLIKIN, produced as a witness on behalf of the Plaintiff in the above styled and numbered cause, taken on the 14th day of November, 2007, in the City of Tulsa, County of Tulsa, State of Oklahoma, before me, Lisa A. Steinmeyer, a Certified Shorthand Reporter, duly certified under and by virtue of the laws of the State of Oklahoma.



Q Why did you feel, again, quoting your own words, without any doubt that the company would be found liable for the litter?

MR. McDANIEL: Object to the form.

A I felt that politically that was a decision that would have been made because of those powers pushing it that way, whether it was the EPA or the City of Tulsa. 03:26PM

Q Next, let me direct your attention to the second page. The next to the last paragraph where you say, Dan, I feel the direction Peterson Farms and all integrators would be best served to focus its resources towards would be alternative uses. Things such as using litter as bedding, feed, fertilizer and fuel are just a few of the uses I've found some information on. Each of these uses has its own set of benefits and shortcomings, but they all address the environmental need to stop applying litter to our local pasture lands. In your position as head of environmental affairs at Peterson Farms, when you wrote that memorandum on March 27th, 1998, why did you say that there was an environmental need to stop applying litter to local pasture lands? 03:27PM 03:27PM

A Because, once again, of the loading of the soils, the lands, the pasture lands of phosphates 03:28PM

and then it getting into the waterways.

Q Did other people at the management level of Peterson Farms agree with you that there was an environmental need to stop applying litter to local pasture lands? 03:28PM

MR. McDANIEL: Object to the form.

A I don't know if they agreed with that paragraph or that sentence.

Q Did they ever express any disagreement with it? 03:28PM

MR. McDANIEL: Object to the form.

A They raised questions and we had discussions, primarily Miss Wilkerson and I, about those things.

Q Did Dan Henderson ever express any disagreement to you with what you stated in this memo to him? 03:28PM

MR. McDANIEL: Object to the form.

A I don't recall that he ever specifically said he agreed or disagreed.

Q Did Vic Evans ever tell you whether he agreed or disagreed with the opinions you put in this memorandum? 03:29PM

MR. McDANIEL: Object to the form.

A I never met with Mr. Evans.

Q Was there any kind of dialogue going on within 03:29PM